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Evaluation in dentistry : a system for assessing the quality of a school-based dental program

Wendy Corn Friedman

EVALUATION IN DENTISTRY -- A SYSTEM FOR ASSESSING THE QUALITY OF A SCHOOL-BASED DENTAL PROGRAM

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by

Wendy Corn Friedman

B.S., R.D.H., Columbia University, 1974

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Windy Corn Friedman
Signature of Author

April 2, 1976
Date

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Wendy C. Friedman

ABSTRACT

A school-based dental program was established at the Mary Hooker Elementary School under a grant from the Robert Wood Johnson Foundation. Administration was under the auspices of the University of Connecticut, Department of Pediatrics. The author participated in the organization of the program. Pertinent literature on evaluation of health care and dental care in particular are reviewed. An evaluation system for this program is developed, which can be extended to other dental care facilities.

As part of the system, the author recommends: that an evaluator be cognizant of the program objectives; that he determine which aspects to evaluate; that he examine the interrelationships between these aspects as well as examine them singly; that he select his methods of evaluation according to the characteristics of a specific program; and that he use more than one method whenever necessary. Three different ways of evaluation are suggested: measuring the extent to which a program fulfills its stated objectives; examining the change in particular components over time; and comparing certain aspects of a program to other programs. Suggestions and recommendations for further research are made.

PREFACE

As a graduate student at Yale University School of Medicine, Department of Epidemiology and Public Health, the author did her field placement at the University of Connecticut Health Center, working on the grant discussed in this essay. The author, a registered dental hygienist, spent five months helping the project director organize the dental component of the urban school health model. Her duties included: interviewing personnel for the program, helping obtain equipment and supplies, consulting on some of the dental forms, organizing the screening program, and arranging for the safety of the dental operatories.

Because this paper was due April, 1976, the author was forced to set an arbitrary date (February, 1976) to terminate collection of information on the development of the program. Due to this situation, some of the background material may be dated.

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Introduction:

Health care providers are being forced to participate in organized review activities. Rising consumer sensitivity to the cost and quality of health care, the passage of legislation mandating professional review activities, and increasing involvement by third party purchasers are the major factors coercing health care providers to participate in review activities. Dental providers are no exception.

> Many voices have been crying in the wilderness to establish guidelines and procedures for measuring quality care in dentistry. But little has been done. Birch concluded in a comprehensive review of the subject that quality control in dentistry must be considered as fiction. Many reasons have been given. "The profession is ethical and has highest standards." "Dentists are well trained and above reproach." "Control is not necessary." Every dentist realizes that the profession produces a range of quality of care from very good to very poor.
>
> A great deal has been published and written concerning the assessment of quality in dentistry. Very little has been applied.[1]

Considering the lack of actual evaluative activities in dentistry and realizing their importance, this essay is directed at assessing dental care at the program level.

The primary objective of this paper is to develop an evaluation system applicable to a school-based dental program. Although this evaluation system is developed according to the needs of a specific dental program, it is a general system that can be applied to other dental programs.

The term "quality" as used in this essay refers to the characteristics of the care delivered in this school-based setting. Although the word is sometimes used in reference to technical quality in this manuscript, it is not limited to this meaning.

This paper is divided into five sections. The first section consists of a discussion of the background of the dental program. The purpose of the second section is to review pertinent literature on evaluation. In the third section of the paper, the particular evaluation for the school program is developed. The evaluation system is based primarily on relevant components of evaluation models discussed in section two. The system will provide a practical and valid appraisal scheme for the Mary Hooker School dental program. In the concluding section the author summarizes the evaluation system and comments on the adoption of this approach to other programs.

I. BACKGROUND OF THE CLINIC:

The dental clinic considered in this essay is part of a larger project designed to evaluate health care delivery through the school setting in contrast to more traditional avenues of health care delivery. The investigation is being conducted by researchers at the University of Connecticut Health Center, Department of Pediatrics. The grant has been funded primarily by the Robert Wood Johnson Foundation. The study was funded for three years, July 1, 1975, to July, 1978. Two models for elementary school health programs are being developed and evaluated. One model has been developed in a suburban community concentrating on early identification and resolution of health related problems that affect growth, development, and learning. The second model, in an inner-city school with a majority of economically deprived children, is providing primary health care services, problem identification, and referral. The first model is providing only medical services, whereas the second model is providing both medical and dental services. The dental program in the second model will serve as the setting for this essay.

In each community a comparison school has been selected to match the model school in terms of grade range, socio-economic status, and racial and ethnic composition of pupils. The existing school health program will remain unchanged in the comparison school. (See Table 1)

Table 1
STUDY DESIGN FOR THE SCHOOL HEALTH MODELS

	Before	During	After
Program Schools (New Program)			
1. Suburban Sample Grade K			
2. Urban* Sample Grades 1 and 4			
Comparison Schools (Existing Program)			
1.a. Suburban Sample Grade K			
2.a. Urban Sample Grades 1 and 4			

* Setting of the dental program discussed in this essay.

This study provides the unique opportunity to link the educational system to the health system, and to examine the effects of this union on the child/patient. Since a child's physical and emotional development is intimately related to his intellectual development, it would seem logical to link these two systems. Present day school health programs are an attempt to link these systems; however, they are usually limited to screening programs with little or no follow up. Therefore, the parents are left with the responsibility of communicating the child's health problems to the educator, and the educational problems to the health provider. Because of various domestic situations, having the parents fill the gap has not always proven effective.

Since populations differ in their use and type of health resources, two different models, one suburban and one urban, were developed. The suburban school draws from a middle class population where most of the children regularly see private physicians and dentists. The school program at the suburban school is aimed at early identification of health related problems and referral followed up by treatment. The urban school draws from an economically deprived population where most of the students have no regular medical and dental care. Their health care is usually limited to "crisis oriented" visits at the local hospital's emergency room. Obviously, there can be no communication between the educational system and the health

system for these children because they have no regular source of health care. Thus, the rationale for delivering primary medical and dental services to this population. By delivering health services at the school site, the traditional barrier to receiving health care (financial restraints, accessibility, communication problems) are removed.

Through an analysis of the effectiveness and cost of the school health models, data will be obtained to determine whether or not these are acceptable methods of linking health services to educational services in each respective population.

In view of the importance of evaluation in the entire project, the significance of an evaluation of the dental portion becomes evident.

For purposes of clarity, the two schools with the model health programs will be referred to as the "program schools," in contrast to the comparison schools. From this point on, only the program school with the dental component, the inner-city school, will be discussed.

POPULATION:

The Mary Hooker Elementary School in Hartford, Connecticut has been chosen as the urban program school. This school serves 750 children from kindergarten to the sixth grade.

> The school neighborhood is almost entirely very low income; 60 percent of the children received ADC funds in 1973, and that percentage is believed to be higher in 1975. Racially, the school is almost two thirds

Spanish and one third black; fewer than 10 percent are white.[2]

As the neighborhood is at a considerable distance from the available Hartford health facilities and as public transportation is inadequate, few of these children would be expected to have a source of comprehensive health care. This school was chosen to be the program school so that the free health services provided would go to children in need of them.

STAFFING:

It is expected that the amount of dental care needed will be greatest during the first year of the program and will decrease over the following two years. Considering this, the amount of professional time has been planned accordingly. The staffing for the first year includes: two full-time nurse practitioners, two full-time bilingual community aides, and a full-time clerk/secretary. A pediatrician has been devoting one day a week to the program, and a nutritionist is employed on a consulting basis. The dental team consists of two dentists together devoting five days a week to the health program, a full-time dental assistant, and a dental hygienist working four days a week. The school social worker will work with the health team when appropriate. The grant provides for monies equal to 60 percent of a dentist's time during the second and third years of the program. The rest of the staff will remain the same over the second and third years of the program.

PHYSICAL ASPECTS OF THE HEALTH PROGRAM:

Similar to most elementary schools, the Mary Hooker School has a health area located in the school comprised of the nurse's office, a dental office, a waiting room, a social worker's room, and a bathroom. Since the health rooms already located within the school did not provide enough space for all the new personnel, a mobile unit was purchased and refurbished to house the model health program. The new health unit contains a large waiting room and working area, two examining rooms, two dental operatories, a conference room, and two bathrooms. All of the rooms are equipped with telephones and sinks. Most of the equipment is new, and all of the supplies and equipment are up to date. Because the health program began partial operation before the new unit was functional, the health rooms located in the school were utilized in the interim.

ADMINISTRATION:

This project is being administered primarily through the Department of Pediatrics at the University of Connecticut Health Center. The head of the department, Dr. Markowitz, and a medical sociologist, Ms. Judy Lewis, are the project directors. Faculty from the Department of Behavioral Sciences and Community Health, University of Connecticut School of Dental Medicine, are providing dental consultations. The University of Connecticut, as well as other hospitals in the area, serve as the referral facilities for all difficult medical and

dental cases. Although the practitioners and school personnel are encouraged to make suggestions, all final decisions concerning program operation are made by the project directors.

One of the nurse practitioners has been given on-site clinical and administrative responsibility for the medical component of the program. Likewise, one of the dentists has been given on-site clinical and administrative responsibility for the dental component of the program.

RECORD SYSTEM - PATIENT RECORDS:

The record system involves two parts, the patient records and the unit activity forms. The system for the medical and dental records are slightly different. In this section a description of the dental record system is given. Because this program is emphasizing unified patient care, both medical and dental records will be stored together. The researchers conducting this study believe that by delivering care in the school setting, the student/patient can be treated as a total individual. Each of the various practitioners can work together as a team to provide better and more efficient care.

Different colors will distinguish the medical, dental, social, and demographic sheets of information. A sample dental patient record is located in the Appendix A. The dental patient records follow the problem-oriented format. "The components of the problem-oriented system are a data base, problem list, diagnostic and/or

therapeutic plans for each problem, and progress notes for each problem."[3-5] This system is especially applicable to this study because of the following qualities. First, it allows for continuity of care when more than one practitioner is treating. Second, the practitioners' care can be easily reviewed; and third, data for research can be readily extracted.

UNIT ACTIVITY FORM:

Besides having a dental record, each time a patient has contact with the dental program, a unit activity form is filled out. The unit activity form provides information basic to the research and evaluation of this grant, and is useful as an operations tool. It is designed to record most of the activities of the dental program and is used for all staff contacts including children, parents, teachers, other professionals, and staff activities such as meetings and case conferences. Since the data obtained on the unit activity form will be computer analyzed, it is possible to provide information in a variety of ways depending on the needs of the program. This information may be tabulated by all of the categories on the form and will be used for the following purposes:

1. Compiling case reports on individual children;
2. Generating monthly statistics and reports;
3. Listing referrals out of the unit so a check for follow-up can be made;

4. Describing patterns of health unit activity;
5. Determination of the incidence of different problems, such as dental caries, and examining changes from year to year;
6. Providing a picture of how staff time is allocated, i.e., percentage of time spent on preventive care; treatment for illness, home visits, teacher and parent contacts, etc.

The unit activity form consists of two pages. The first page has two sections, the top for coding information about the activity, and the bottom which lists the various codes for each category. The top section of the second page is a carbon of the coded information on top of the first page. The bottom of the second page is blank in order to provide space to write extra case notes. The first page goes into the research file and the second page goes into the child's record. A sample of the dental unit activity form can be found in the Appendix B.

DESCRIPTION OF THE DENTAL PROGRAM:

Originally the school health models were designed to deal only with medical problems.

After the medical programs were developed, it was decided that the urban school would provide both medical and dental services. The objectives and activities of the dental program reflect that it was truly an addition to the original program.

Consider the description of the dental program as stated in the original proposal submitted to the Johnson Foundation:

> Preventive and restorative dental services will be available to all children at the school. Preventive services will consist of evaluation and prophylaxis by the hygienist twice yearly, a weekly fluoride rinse for all children (to be done in the classroom), and a weekly fluoride treatment by the hygienist for high risk children.
>
> Restorative services will take place under the direction of the pediatric dentist, aided by the dental hygienist and the dental assistant. It is anticipated that these services will need to be maintained full-time for the first year. Restoration needs in the following years will depend largely on the number of children who transfer into the school.
>
> The area of prevention of dental disease lends itself particularly well to evaluation. The cost effectiveness of this program and specifically its preventive component can be neatly studied.[2]

As stated on the original proposal, the objectives of the dental program are very general, which made it very difficult to devise an evaluation system. Because the dental program objectives were only roughly outlined, the evaluation system had to be created in non-specific terms. The researchers and practitioners are aware that they must state more specific objectives in order for the dental program to operate and so that the evaluation can determine the success or failure of the program. The evaluation system presented in this paper allows for the specific objectives to be plugged in when they are designed. The preceding statement can be understood by the following analogy: The evaluation system is like a mathematical formula, and the

specific objectives are the numbers that fit into the formula. In the evaluation system, the author states that the decay index should decrease. The specific objectives will state the amount of the decrease. Without the specific objectives to fit into the evaluation system, the success or failure of the program cannot be determined.

BASELINE DATA FOR THE DENTAL PROGRAM:

Data regarding the level of dental health of the students was needed to effectively plan the dental program. Since there was a dental hygienist employed by the school system before the inception of this new program, it was assumed that baseline data could be collected by reviewing the dental records that she had kept on these students. However, these records did not prove sufficient for establishing accurate baseline data. The researchers felt it necessary to gather their own data to gain an accurate estimation of the dental needs of this population. A screening program was conducted for this purpose. The screening served as an introduction for the dental program and elicited preliminary data for research purposes. All 750 students at the school were screened. Plaque, gingival, and DMFS indices were determined. A sample screening form and an explanation of the indices can be found in Appendix C.

The students were given a priority rating according to their dental condition. The priority scheme allowed students with the

most urgent dental problems to be examined as soon as possible, whereas the rest of the students were examined in time according to the severity of their dental condition. An explanation of the priority classification system can be found in Appendix D. At this point, consent forms were sent out for all students in the priority one category. The number of students who return the consent forms is recorded on a flow chart. This will also be done for priority groups two and three. The flow chart will serve as a record for the number of treatment plans completed. This data will be used to tabulate utilization rates. An example of the flow chart and consent forms can be found in the Appendices, E and F.

STUDY SAMPLE:

The study sample was identified in the original proposal. It states:

> In the urban community, where the mobility rate is much higher, all children entering the first and fourth grades of the model and control schools in September, 1975, will with parental consent, constitute the study sample. Based on a 40 percent mobility rate in 1973 figures, all available children in these grades must be included in the study sample to allow for a 20 to 30 percent sample at the end of three years. (n = 50 to 60)
>
> Because of the high mobility rate, and the fact that children who move most may be at greatest risk, an attempt will be made to locate these children at the end of three years.[2]

This study sample will apply to the dental and all other areas of the school health model.

II. REVIEW OF THE LITERATURE:

This section, a review of pertinent literature, consists of four major parts. In the first part there is an explanation of three major conceptual approaches to evaluation. Methods of collecting evaluative data are reviewed in the second part. The third part identifies components of evaluation thought to be necessary by experts in the field of dental care appraisal. For purposes of explanation, these components are classified according to the Donabedian conceptual approach. Finally, in the fourth part, the content of actual evaluations for nine different dental programs are identified. In order to compare what was actually evaluated in dental programs to what was proposed to be evaluated, the content of these evaluations are classified according to the Donabedian approach.

CONCEPTUAL APPROACHES TO EVALUATION:

When devising an evaluation system, it becomes useful to review conceptual approaches to evaluation reported in the literature. Although three conceptual approaches are cited, major emphasis is placed on the Donabedian model.[6] The Donabedian model will serve as the basis for the evaluation system proposed in this essay.

The Donabedian approach was selected to serve as the basis for this evaluation system because it is a general framework adaptable to evaluation at the program level. Secondly, many

evaluation applications reported in the literature are based on this approach. Basing this evaluation system on the Donabedian approach facilitates comparison of this system to others described in the literature. A description of the approach follows:

Donabedian Model:

The Donabedian model, referred to as the structure, process, and outcome model, is a framework specifically proposed for health care appraisal. Donabedian suggests that evaluators examine the program in terms of three dimensions: structure, process, and outcome.

ASSESSMENT OF STRUCTURE:

> Assessment of structure involves the evaluation of the settings and instrumentalities available and used for the provision of care. While including the physical aspects of facilities and equipment, structural appraisal goes far beyond to encompass the characteristics of the administrative organization and the qualifications of health professionals.[6]

There are two major assumptions when structure is used as an indicator of quality.

> First, that better care is more likely to be provided when better qualified staff, improved facilities, and sounder fiscal administrative organization are employed. Second, that we know enough to identify what is good in terms of staff, physical structure, and formal organization.[6]

Donabedian emphasizes that staff qualifications, physical structure, and formal organization is not equated with quality.

It is only expected that there is a relationship between good structural elements and quality. Structural analysis is routinely used in the evaluation of service-providing programs. Examples of structural appraisal include: licensure of dentists, accreditation of graduate programs, and certification of facilities.

ASSESSMENT OF PROCESS:

Assessment of process refers to the features and activities which define the interaction between the provider and the patient in the context of providing health care. Process appraisal attempts to evaluate the content of services and how they are actually delivered. Process assessment examines such factors as the appropriateness of care, technical quality of restorations, and the efficiency of any defined service.

> When evaluation of process is the basis for judgments concerning quality, a major assumption is that health care is useful in maintaining or promoting health. Furthermore, there is an explicit or implicit assumption that particular elements and aspects of care are known to be specifically related to successful or unsuccessful health outcomes or end results.[6]

Process appraisal is commonly used in both medicine and dentistry to determine the quality of care. Peer review activities, examining appropriateness of treatment and technical quality are examples of process appraisal. To evaluate the process of care, specific standards must be developed. Problems determining uniform standards arise among researchers and

practitioners.

ASSESSMENT OF OUTCOMES:

> Assessment of outcomes is the evaluation of end results in terms of health and satisfaction. That this evaluation is in many ways, provides final evidence of whether care has been good or bad or indifferent is so because of the broad fundamental social and professional agreement on what results are deemed desirable.[6]

"The rationale for the use of outcome appraisal rests on the directness of the measurement which obviates the necessity to make assumptions in evaluating structure and process."[7]

Examples of outcome appraisal include analysis of mortality statistics, morbidity statistics, and disability statistics. Bailit and Schonfeld[8] suggest that an attempt should be made to measure outcomes in light of improved social functioning and patient satisfaction. The problems with using outcome measures alone to evaluate a program are as follows: Factors having nothing to do with the program activities may be reflected in the end results. Secondly, if only outcome measures are examined, the evaluator is ignorant of the components that contributed to that result, and he is unable to suggest improvements for the program. Third, outcome measures are usually those most quantifiable and these may not necessarily be the ones of most interest. Thus, it is possible to collect a lot of purposeless data if one concentrates only on outcome measures. This is a common problem in assessment of organizational performance.

Although Donabedian's measures of evaluation have been

explained separately, they are not intended to be used independent of one another, nor should one be selected in preference to the other.

". . . it should now be clear that the three approaches are interrelated. . . The total information obtained when all three approaches are used simultaneously may well be greater than the mere sum of the three, since knowledge of the interrelationships among them gives a deeper understanding of the state of patients' care."[6]

Schonfeld Model:

Based on his administrative and academic experience, Schonfeld[9] has developed a system for evaluating community dental care programs. He attempts to assess the total scope of quality within his model. His framework is based on four levels of concern and four dimensions of resources. The four levels of concern include:

1. Individual service (e.g., single restoration).
2. Mouth (e.g., relation of the placement of a restoration to the condition of the surrounding gingiva).
3. Individual (e.g., restorative or orthodontic treatment in relationship to appearance and social functioning).
4. Community (e.g., what proportion of persons in the community receive any care at all).

The four dimensions of resources that must be evaluated in Schonfeld's quality appraisal include the following:

1. Technical (e.g., the specific techniques utilized, such

as instruments and materials).

2. Professional logistic (e.g., kind of services rendered, for whom, by whom, treatment decisions).

3. Organizational (e.g., interrelationships among personnel, facilities, programs).

4. Financial (e.g., fee for service, capitation).

Basically, Schonfeld's evaluation scheme involves reviewing each level of concern in terms of each of the four dimensions of resources. Schonfeld's model was not chosen to serve as the basis for this evaluation system because his approach involves too many factors making evaluation difficult at the program level.

Friedman Model:

Friedman has written A Guide for the Evaluation of Dental Care.[10] "The guide is intended for use not only by dental practitioners, but also by trained lay administrators and clerical personnel responsible for the administration of dental care programs and the processing of authorization and treatment claim forms."[10] It reviews the various kinds of dental services most often needed by patients in the average dental practice. The guide is divided into four parts. Part A is divided into sections. Each section describes a phase of dental practice, followed by a discussion of the most significant features to be considered in the evaluation of treatment. The criteria for assessing the technical quality of care is listed in Part B. Part C contains a set of forms that can be used for both the direct and indirect

evaluation of specific cases. The last section, Part D, presents performance features and summarizes these features in data tables. The performance features include: utilization rates, service rates, evaluation ratios, time distribution, and cost comparisons. The preceding discussion was intended to acquaint the reader with the guide. For more thorough understanding, the reader should refer to the guide. The Friedman approach was not chosen as the basis for this evaluation system because it specifically applies to a technically oriented general dental program. Friedman considers pedodontics as one small part of a general dental program. The dental program considered in this essay is a pedodontic program emphasizing preventive, rather than restorative dentistry.

To conclude, the author felt that the Donabedian approach provided a general framework which allowed for the creation of an evaluation system specifically tailored to the needs of a school-based dental program. Secondly, it provides a common framework to compare this system to others reported in the literature.

METHODS OF COLLECTING EVALUATIVE DATA:

In this second section of the review of the literature, there is a discussion of methods of collecting evaluative data.

Methods of collecting data are important to consider when designing an evaluation system. DeJong and Dunning deal with

this issue in their paper entitled, "Methods of Evaluating the Quality of Programs of Dental Care."[11] They state that although evaluations of quality may appear in different forms, all can be classified into three categories: direct observation of care provided, observation of end results, and review of patients' dental records. A review of their discussion concerning the advantages and disadvantages of each method follows.

The direct observation of dental procedures is usually used to evaluate dental students. This technique is advantageous because it allows a first-hand appraisal of dental procedures while they are being performed. The dentists' manner of handling a patient, completing a diagnosis, planning treatment, and manual dexterity can be observed. "This approach has three disadvantages: the observer bias, the extreme cost in time and money, and a disturbed relationship between the operator and his patient."[11] For these reasons this technique is usually reserved for use in the dental school. The second method discussed is the observations of results. The major advantage of this technique is that completed dental treatment usually remains visible for examination for some time. DeJong and Dunning state, "Although the end result of the practice of restorative dentistry remains readily visible for some time, this approach, from a practical standpoint, may not be the one to use. It requires dental facilities for examining the patient, a dental practitioner to make an evaluation, and an extra visit by the patient."[11]

Later they mention that this method fails to consider the appropriateness of treatment rendered or the setting in which the dentist-patient encounter occurred. They do suggest that this method has a place within an evaluation system. Consider the following:

> Only when the program utilizes a sampling technique for selecting patients can this approach be accepted as practical and economical. It can be applied to the evaluation of a large program, however, as an adjunct to statistical review. Once unusual patterns of care have been detected by the use of a statistical technique, the final evaluation can be based on a review of the end result as patients are being examined to determine the quality of the services.[11]

DeJong and Dunning conclude their paper by discussing the third method of evaluation, review of the patients' dental records. They state that this approach is used by the National Health Service in Great Britain in calculating national averages for the types and number of procedures, procedure ratios (e.g., number of prophies/extractions), and patient loads. They feel that the statistical review of patients' records probably has the greatest possibilities as a practical means for evaluating a program of dental care."[12]

In a paper entitled, "PSRO's in Dentistry,"[12] Friedman advocates the use of post-operative radiographs to evaluate the technical quality of dental care.

Bailit and Schonfeld[8] suggest that attitudinal information measuring patients' satisfaction should be included in an evaluation system. Questionnaires and interviews are the most

common direct method of collecting data on satisfaction.

COMPONENTS OF EVALUATION SUGGESTED BY EXPERTS IN THE FIELD:

When devising an evaluation system, one needs to ascertain which elements of a program are necessary to evaluate. From his review of the literature, Balzer[7] provides such a list. He identifies components of evaluation which are thought to be necessary by experts in the field of dental care appraisal. For purposes of clarity, he classifies these elements according to the Donabedian framework (See Table 2). It must be understood that these components were identified from proposed models rather than from evaluations of actual dental programs. In the following section in this review of the literature, components of evaluation used in actual dental programs are identified.

TABLE 2

PROPOSED COMPONENTS OF EVALUATION*

I. Components of Evaluation Related to Structure

A. Physical plant; including space, number of operatories exterior of building

B. Equipment and supplies

C. Safety of workers and patients

D. Personnel; including a statement of the kinds, numbers qualifications, tasks, and income

E. Administrative structure; including hierarchal chain of command and governance

F. Program planning mechanism

G. Statement of program objectives

H. Financial arrangements; including how the program is financed and how it spends its money and budget

I. Comprehensiveness of services and of population served

J. Availability of program and of alternative care facilities in the community

K. Accessibility; geographic, socioeconomic, related to eligibility, and related to health knowledge

L. Provision of self-evaluation mechanism

M. Provision of side benefits; including educational research related, and demonstration projects

N. Demographic data

O. Program policy; including appointment schedules, treatment authorization, eligibility

P. Allocation of services; including a statement of rationale

Q. Adequacy; including a statement of how well the program is meeting the needs of the community

Table 2, continued:

II. Components of evaluation Relating to Process

A. Appropriateness of treatment; including a statement of patient needs and demands

B. Technical quality of treatment

C. Inputs; including capital, personnel, and materials

D. Outputs; including services performed and monetary value of services

E. Productivity measures; measurement of output related to input, e.g., number of services per man hour

F. Efficiency measures; measure of productivity in financial terms, such as cost/benefit analysis

G. Utilization rates

H. Direct observation of treatment

III. Components of Evaluation Related to Outcomes

A. Morbidity statistics; such as DMF, PI, and number of extractions required

B. Disability statistics; such as the number of days lost from work because of dental pathology

C. Social functioning; such as inability to maintain a job because of poor dental appearance

D. Satisfaction of the patient and the provider

Source: J.A. Balzer, An Evaluation of the Methods Used for the Assessment of the Quality of Dental Care Programs. Term paper, program of dental public health (Ann Arbor, University of Michigan School of Public Health, 1973), pp. 33-4.

COMPONENTS USED IN THE EVALUATION OF NINE ACTUAL DENTAL PROGRAMS:

In the same work, Balzer[7] also identifies the components used in the evaluation of nine actual dental programs. For purposes of comparison, he classifies each of these evaluative components under the appropriate category in the Donabedian model. It is useful to compare what was proposed to be evaluated to what was actually evaluated in nine dental programs. He arranges this information in a chart (See Table 3). On the horizontal axis are the proposed components of evaluation (same material as Table 2), and on the vertical axis are the names of the nine dental programs which were evaluated.

From analyzing this chart (Table 3), one observes that none of the following components were included in the evaluations of the nine dental programs: safety, program planning, disability, and social functioning. Each of the following components were evaluated by only one of the nine programs: equipment and supplies, administrative structure, policy, and satisfaction. Program objectives, allocation of services, appropriateness of treatment, and morbidity were evaluated by two of the nine programs considered. Of the nine evaluations reviewed, seven included structural and process appraisal, whereas only three evaluated some type of outcome appraisal.

Without considering the objectives and financial constraints of each evaluation, it is difficult to specifically comment on

TABLE 3

PROPOSED COMPONENTS OF EVALUATION AND COMPONENTS USED IN ACTUAL STUDIES*

Components Provided by Proposed Models

Actual Studies	Physical Plant	Equipment/ Supplies	Safety	Personnel	Administrative Structure	Program Planning	Program Objectives	Financial Arrangements	Comprehensiveness	Availability	Self-Evaluation	Side Benefits	Demographic Data	Policy	Allocation	Adequacy	Accessibility	Appropriateness	Technical Quality	Inputs	Outputs	Productivity	Efficiency	Utilization	Direct Observation	Morbidity	Disability	Social Functioning	Satisfaction
				STRUCTURE																PROCESS						OUTCOME			
Three Programs	√			√	√		√	√	√		√	√	√							√	√								
Fisher								√	√				√	√			√			√	√			√					
Brightman Allaway				√					√		√		√				√	√	√	√	√	√	√	√					
Cons																			√		√								
Head Start				√						√	√	√				√	√				√								
Friedman	√	√		√			√	√	√	√	√	√	√		√	√	√	√	√	√	√	√	√	√					√
Schoen				√					√	√			√		√	√	√			√	√	√	√	√		√			
Jong and Leverett	√			√								√	√				√			√	√	√	√	√					
Murphy and Young																					√					√			

*Source: J.A. Balzer, An Evaluation of the Methods Used for the Assessment of the Quality of Dental Care Programs. Term paper, program of dental public health, (Ann Arbor, University of Michigan School of Public Health, 1973) Chart #1

the rationale for including or omitting various components of evaluation. Generally, it appears that most of the components which are easily counted and accessible (i.e., outputs, inputs, efficiency, personnel, comprehensiveness) are most frequently evaluated. Those components, where data collection is more of a problem (morbidity, disability, social functioning, and satisfaction), are less frequently included in these evaluations. The fact that program objectives were evaluated in only two of these programs reflects that there is a problem in this area. Since one of the major methods of evaluating a total program is based in a comparison of outputs and outcomes to program objectives, lack of information on program objectives handicaps an evaluation. Information on program objectives might have been omitted from these evaluations because the evaluators found that the programs lacked measurable objectives.

From his experience in examining both proposed models of evaluation and actual evaluations of dental programs, Balzer concludes:

1. Critical evaluation of any attempt to assess the quality of a dental care program must be done in relation to the stated objectives of the evaluator.

2. There is considerable variation in proposed and actually used methods for evaluating the quality of dental care programs.

3. There is a need for some general agreement within the profession concerning what components of evaluation are appropriate for use in the evaluation of dental programs.

4. Lack of outcome measures is a serious drawback in evaluation of dental programs. The actual improvement in health status, however, can be monitored only by use of

> an outcome measure such as a decrease in periodontal disease or in cases of handicapping malocclusion. Absence of outcome data makes the straightforward evaluation of the quality of care of any program considerably more difficult and forces are to rely upon more questionable, less direct, and possibly less valid measurements relating to structure and process.[7]

To conclude, from this review of the literature, the author provides the background for the development of the evaluation system presented in this essay. Conceptual approaches to evaluation are reviewed, methods of collecting evaluative data are discussed, components of evaluation recommended by experts in the field are identified, and the content of actual evaluations of dental programs is described.

III. DEVELOPMENT OF THE EVALUATION SYSTEM:

As mentioned in the section Background of the Clinic, the Mary Hooker School dental program is one part of a larger research project. The research project considers two levels of evaluation, referred to in this essay as an external and an internal level. To convey this concept, the author uses the words "external" and "internal" according to the following description: Evaluation at the external level refers to the fact that students participating in the special school-based dental program are being compared to students at a comparison school exposed to traditional community dental facilities. (THESE STUDENTS MAY OR MAY NOT BE RECEIVING DENTAL CARE.) The internal level of evaluation refers to a determination of the relative success or failure of the Mary Hooker School dental program. The purpose of this essay is to develop a system for evaluating the Mary Hooker School dental program. From the previous discussion, this is considered to be evaluation at the internal level.

The element of external evaluation makes this research program unique, therefore, evaluation at the external level would have little applicability to other programs. Focusing on evaluation at the internal or program level increases the applicability of this approach to other programs.

The following section consists of four parts. In the first part the author suggests objectives of evaluation for

the dental clinic at the Mary Hooker School. The second part consists of a discussion which identifies the most appropriate methods of collecting data for this particular setting. In the third part, the author reviews each of the components of evaluation proposed by experts (refer to Table 2) and discusses their appropriateness for this evaluation system. Finally, in the fourth part there is a discussion of the most important components to consider in the evaluation of the Mary Hooker School dental program.

OBJECTIVES OF EVALUATION:

In this section the author has devised objectives of evaluation for the Mary Hooker School dental program. This list should not be confused with a list of program objectives. This list of evaluation objectives are the goals for the evaluation of this program. A list of program objectives are statements of program goals. Examples of appropriate program goals are: To provide a dental health education component, to decrease DMFS scores 20 percent from the onset of the program to the end of the program, to evaluate the program, etc. Evaluation of the program would only be one of the program goals. As mentioned earlier in the section entitled, "Background of the Dental Program," at this point the program goals for the Mary Hooker School dental program are only roughly stated. This is the reason that examples of program goals rather than actual program goals, were presented to clarify the distinction. The objectives of evaluation follow.

1. To examine dental care received by students enrolled in the Mary Hooker School dental program in terms of the following single dimensions:

   a. Number of students receiving dental care

   b. Level of dental health measured by DMFS index

   c. Cost of dental care

   d. Continuity of dental care (e.g., same provider)

   e. Regularity of dental care

   f. Level of dental health knowledge measured by questionnaires and interviews

   g. Oral hygiene practices measured by questionnaires, interviews, and oral hygiene index

   h. Attitudes towards dental care and dental disease measured by questionnaires and interviews

2. To evaluate a school-based method of delivering dental care in terms of quality and cost by analyzing interrelationships between structural, process, and outcome variables.

3. To determine advantages of delivering dental care along with other health and human services

Data collected from the objectives stated above will be used:

1. To identify and correct deficiencies in the program.

2. To yield information for program policy and program management.

3. To perform evaluation as efficiently as possible, avoiding excessive and inappropriate drain on the program's resources.

APPROPRIATE METHODS OF COLLECTING DATA:

From the previous discussion on methods of collecting data (Section II, Review of the Literature) it appears that all of

the methods have their relative advantages and disadvantages. ". . . No single technique of evaluation can answer all types of questions that are posed."[13] The record review system recommended by DeJong and Dunning[11] appears to be the most practical and appropriate primary type of approach for the Mary Hooker School dental program. Data can be gathered without significantly imposing on the practitioner's or the patients' time. Since most of the data can be collected and keypunched by non-professionals, the system proves less costly than others mentioned in the review of the literature.

Although other methods of collecting evaluative data have been considered, they cannot be recommended as a primary approach for this particular dental program. The direct observation of treatment method would be a poor choice as a primary method for this setting because of its cost and disturbed dentist/patient relationship. A system based on radiographs for evaluation would also be inappropriate for this setting because the number of x-rays taken will be minimal. Furthermore, a program using radiographs as a central method of collecting data emphasizes appropriateness and technical quality of restorative care. This is a pediatric program emphasizing preventive care. The clinical exam method would be a poor alternative because of its expense in terms of the dental practitioners' time and an extra visit by the patient. This program attempts to limit the amount of time that the child misses classroom activities. Any extra time away

from the classroom should be avoided. Although all these methods have their disadvantages as a primary means of collecting data, they each have a place in this evaluation system. The record review method will reveal problems that may be dealt with by directly observing the practitioner/patient encounter and/or structural aspects of the program. Clinical and radiographic examination will be valuable tools in investigating individual cases. Attitudinal and educational information about the students and their parents will be obtained through questionnaires and interviews. The aides will go out to the community and interview selected parents to gather data pertaining to their satisfaction towards the school health program and to establish their dental I.Q. and oral hygiene practices. Selected students will also be questioned and/or interviewed to gather information about their attitudes of the health program, their dental knowledge, and their oral hygiene practices.

To conclude, although this evaluation system primarily utilizes the record review approach, direct observation of treatment, clinical and radiographic exam, questionnaire and interviews have their place as adjunct methods of collecting evaluative information.

GENERAL DESCRIPTION:

The elements comprising this evaluation system are developed through an assessment of components for evaluation suggested by experts in the field of dental care appraisal. The assessment is

based on applicability to this dental program. The section basically follows Table 2 and is arranged according to the structure, process, and outcome framework. For purposes of explanation, each section begins with the proposed components of evaluation taken from Table 2. When necessary the author contributes original components of evaluation significant to this dental program.

The evaluation of this program is based on three different categories of information: 1.) Examining the change in the various components over time; 2.) Measuring the extent that this program fulfills its objectives; and 3.) Comparing different aspects of this program to a body of results and information from other programs. To clarify the preceding categories of information, examples of each are given.

First, the evaluators will monitor the change in the types of services delivered over the three years. Since the researchers have emphasized that this is a preventive program, a trend towards more preventive and less restorative services would be one of the factors indicating the success of the program.

It is difficult to give an actual example for this second category because the specific program goals haven't been determined (Refer to section on the Background of the Clinic, Description of the Dental Program). In order to explain this category, the author has created an example. Consider the specific program objective to be: To provide primary treatment

to 80 percent of the students. If the utilization rates indicated that only 65 percent of the students were receiving primary care, then this objective would not have been fulfilled. As part of the program objectives, the researchers must also predetermine the number of program objectives that must be fulfilled to indicate success.

An example of the third category of evaluative information applies to technical quality of dental treatment. The technical quality of the dental work will be evaluated according to a recognized manual of clinical standards developed for another program like the Indian Health Service Manual.[14]

The system is described in a general fashion. The author does not intend to deal with specific problems of implementation in this paper.

STRUCTURE:

I. Components of Evaluation Related to Structure

A. Physical plant; including space, number of operatories, exterior of building

B. Equipment and Supplies

C. Safety of workers and patients

D. Personnel; including a statement of the kinds, numbers, qualifications, tasks, and income

E. Administrative structure; including hierarchal chain of command and governance

F. Program-planning mechanism

G. Statement of program objectives

H. Financial arrangements; including how the program is financed and how it spends its money; its budget

I. Comprehensiveness of services and of population served

J. Availability of program and of alternative care facilities in the community

K. Accessibility; geographic, socioeconomic, related to eligibility and related to health knowledge

L. Provision of a self-evaluation mechanism

M. Provision of side benefits; including educational, research-related, and demonstration projects

N. Demographic data

O. Program policy; including appointment schedules, treatment authorization, eligibility

P. Allocation of services; including a statement of rationale

Q. Adequacy; including a statement of how well the program is meeting the needs of the community

The structural components are very significant in this study. The school-based structure distinguishes this program from most dental programs. For this reason, data will be available on all of the components listed on the preceding table. Most of this information is readily accessible from the original proposal submitted to the Johnson Foundation, administrative records, and reports of the program regularly submitted to the Johnson Foundation for review. Having this information on record enables the evaluator to examine each of the various structural components of the program and to compare the structural components of this program to other programs. With structural information available, the evaluators can establish the effect that this particular structure has on process and outcome variables. This concept can

be applied at two levels. For purposes of this discussion, the first level is called a "research" level, and the second level is called a "problem oriented" level. Consider the research level first. What effect does the paraprofessional staffing have on the cost and productivity of the program? What effect does accessibility and eligibility have on the utilization rates? What effect does continuity of care have on oral hygiene compliance rates? Analysis of the relationship between structural components and process and outcome variables may be necessary to find the origin of specific problems. For example, if prophy rates are low for a given period, it would be necessary to investigate the equipment and personnel (e.g., was the slow handpiece in working order? Has the hygienist been coming to work regularly? Was there enough prophy paste? Does she dislike doing prophies?) Although many more examples could be given for each category, the author feels these suffice to convey the general point. It is expected that many more of these types of interrelationships are reviewed in the actual evaluation of the Mary Hooker School dental program.

PROCESS APPRAISAL:

The elements of process appraisal are important in this evaluation system. For purposes of clarity, this section is divided into two parts. The first part consists of a review of components of evaluation relating to process as listed in Table 2.

In the second part, the author suggests some additional components of evaluation not listed in Table 2, and describes the use of the unit activity form (refer to Background of Clinic, section on records) in the collection of process data. Conceptually, both parts are related but for purposes of explanation they are separated.

PROCESS APPRAISAL, PART I:

I. Components of Evaluation Related to Process

A. Appropriateness of treatment; including a statement of patient needs and demands

B. Technical quality of treatment

C. Inputs; including capital, personnel, and materials

D. Outputs; including services performed and monetary value of services

E. Productivity measures; measurement of output related to input, e.g., number of services per man hour

F. Efficiency measures; measure of productivity in financial terms, such as cost/benefit analysis

G. Utilization rates

H. Direct observation of treatment

According to this evaluation scheme, it is important to review appropriateness and technical quality of treatment. These two components should be evaluated by some type of peer review activity. It is suggested that an outside practitioner review a representative sample of each practitioner's work each year. A manual of clinical standards, similar to the Indian Health Service booklet,[14] should be used as criteria. To evaluate the

appropriateness of treatment, the outside practitioner might review a sample of pre- and post-operative radiographs.

To assess technical quality, it is advised that an outside evaluator perform clinical exams on a sample of patients whose dental work is completed.

Component C:

The Mary Hooker School program keeps record of all inputs. This information is necessary for the grant mechanism, and will be necessary for the cost analysis. Inputs includes capital, personnel, and equipment.

Component D:

Outputs for service rates will be collected from the unit activity form and will provide information on the number and types of services. Examples of the types of services delivered in the dental clinic include:

1. Preventive
    a. Full mouth series
    b. Bite wings radiographs
    c. Prophylaxis
    d. Fluoride
    e. Home care
2. Tooth Mortality
    a. Percent of TM at initial care
    b. Percent of TM at secondary care

3. Tooth Preservation Rate

    a. Filling rate

    b. Crown rate

    c. Endodontic rate

4. Evaluation Ratios

    a. Filled/Extracted

Over the three years a review of service rates should show:

1. A trend towards more preventive and less restorative services.

2. Greater percentage of tooth mortality at initial care than at secondary care (less teeth should have to be extracted when maintenance care is being given).

3. The crown and endodontic rates should decrease (these services are indicated in cases of extreme dental pathology and/or trauma).

4. The evaluation ratio should reflect a trend of greater than one (more filled teeth, less extractions).

Component E (Productivity):

Number of services per man hour. It will be necessary to collect data on the time it takes each practitioner to perform each procedure. Information will be collected from a comparison of the time it takes for each practitioner in the Mary Hooker School dental clinic to perform a particular procedure, to standard time rates to provide that procedure. It is also necessary to collect data on the total number of services delivered by each practitioner every hour. This is suggested to account for the situation when the practitioners perform a particular procedure within a reasonable time limit (according

to a standard time range), and wastes the remainder of his working hour. If it is determined that the practitioner is not as productive as he could be, then remedial measures can be taken.

Component F (Efficiency):

This measure is one of the most important to look at. Since this area is so vital to the entire research project, an economist has been hired to perform a cost analysis of the entire program. Figures for the entire research program will be derived on an annual basis. The following is a list of figures that should be derived for the dental program:

1. Total cost of the dental program at the Mary Hooker School.
2. Cost per child in the dental program.
3. Cost per visit in the dental program.
4. Cost of dental health care for children in the study grades (1 and 4 at Mary Hooker School).
5. Cost of dental services by type of procedure for Mary Hooker program.
6. Cost differential (when different types of provider deliver the same service, Dental Hygienist vs Dentist).

A more detailed description of the cost analysis is beyond the scope of this paper.

Component E (Utilization):

This measure is very significant. It tells:

INITIAL CARE:

1. The proportion of the school population that receives at least initial exam and/or emergency services.

2. The proportion of new patients that receive needed dental treatment indicated by the initial exam.

MAINTENANCE:

1. The proportion of the eligible population that returns for periodic examination at specific intervals.

2. The proportion of eligible population that receives needed services as indicated at subsequent exams.

This information is currently being recorded on the flow chart. (Refer to Background of the Clinic, section baseline data for the dental program.) On the flow chart, the students are divided into groups according to treatment priority listing. Information pertaining to the number of consent forms returned and treatment plans completed are included on this form.

In the specific objectives of the program, there should be a statement applicable to the level of utilization. The actual level of utilization can be compared to the level specified in the objectives to determine success in this area.

Component H:

Balzer[8] considers direct observation of treatment an evaluation component relating to process. The author of this paper thinks that this is a mistake of classification and considers direct observation a method of collecting data rather than an evaluation component. For this reason, direct observation has

been discussed in the section on methods of collecting data.

PROCESS APPRAISAL, PART II:

The information on components C - G (table beginning the section on process) is collected from the unit activity form (see section Background of the Clinic, Record System). The specific type of information collected for each component is discussed in the previous section on Process. Other types of information which were not included in the table but are recommended to be collected from the unit activity form are:

1. Incidence of disease: Have the patterns of disease incidence changed over the course of the program?

2. Case reports on individual children: This is necessary for evaluation of specific cases.

3. List of referrals: This information is necessary to assure follow up on these referrals.

4. Time spent on restorative services, preventive services, teacher contacts, and home services is recorded on the unit activity form. By combining information on time spent on each service with the numbers and types of services provided, the aggregate allotment of staff time can be ascertained. This information is useful in establishing the amount of time given to the different types of services. The preventive rather than restorative philosophy of this program should be reflected in this data.

The data collected on the unit activity form discussed in both sections on Process Appraisal should be processed monthly. Having a regular review of process variables enables the administrators to monitor and regulate the direction of this program.

COMPONENTS OF EVALUATION RELATED TO OUTCOMES:

A. Morbidity statistics; such as DMF, PI, and number of extractions required

B. Disability statistics; such as number of days lost from work because of dental pathology

C. Social functioning; such as inability to maintain a job because of poor dental appearance

D. Satisfaction of the patient and provider

OUTCOME MEASURES:

Evaluation through analysis of outcomes provides the final evidence of whether or not a program has truly altered the health of a population. "The actual improvement in health, however, can be monitored only by use of an outcome measure. . ."[7] Since the researchers want concrete evidence of the success of the dental program, outcome measures are considered an important component of this evaluation system.

Component A (Morbidity Statistics):

The DMFS (decayed, missing, and filled surface) index is used to record the caries experience of a population. Since dental caries is the major cause of dental disease in people under 35, the DMFS scores are an appropriate indicator of the dental health of this pediatric population. It is, therefore, recommended that DMFS scores are collected each year for evaluation purposes.

It is necessary to establish the DMFS scores on a representative sample of students at the onset of the program, during the second

year of the program, and at the end of the program. DMFS scores were determined at the onset of the Mary Hooker School dental program as part of the screening examination. (See Background of the Clinic, section on Baseline Data for the dental program.) Through an analysis of DMFS scores over the three years, one can see whether or not this program is actually affecting the caries experience of this population. If this program is affecting the dental status of this population, the rate and direction of change can be observed.

As previously mentioned (refer to Background of the Clinic, section on Description of Dental Program), the specific program objectives have not been determined. One of the objectives should be directed at determining a value for DMFS change over the three years in this population. A comparison of the actual change in DMFS scores to the change in DMFS scores stated in the program objectives will yield information significant in determining the success of this program.

Data concerning the change in DMFS scores for this program can also be compared to similar data from other programs. Information from this type of comparison will also yield information on the relative success or failure of this program.

The P.I. (Periodontal Index) is not recommended for use in this evaluation system. This index reflects the periodontal condition of a population. Since periodontal disease is not common in this age population, the use of the index would not be

appropriate for this program. It will be useful to look at the number of extractions required at the onset of this program, during the second year of the program, and at the end of the program. This information is important to determining the effects of this program on this population.

Component B (Disability):

Number of days missed from school because of dental pathology. Data on disability will show the extent that dental disease contributes to the absence rate in this population. Disability statistics should be gathered by questionnaire and interview. Disability data can also be collected by recording the number of children who leave class to see the dentist because of urgent dental problems. However, this data may be biased because of the existence of the dental clinic at the school site. Nevertheless, because of regular dental care this type of occurrence should decrease over the course of the program.

Component C:

Although social functioning[8] has been suggested as an important outcome measure in dental programs, it cannot be recommended for inclusion in this evaluation system. This has been decided because sophisticated methods for measuring social functioning have not been adequately developed.

Component D:

Patient and provider satisfaction are important outcome

measures and are recommended to be considered in this evaluation system. "The purpose of measuring patient satisfaction is not to judge the technical quality of care since several studies have shown that patients are generally not good judges of the care they receive. Rather, patient satisfaction is indicative of program features such as accessibility, acceptability, comprehensiveness, and so on. This in turn can be reflected in varying utilization rates, patient compliance and overall growth of the program."[8] Since the patients in this program are children, this provides an interesting situation at both the research and the program level. Providing children received positive experiences, compliance rates (e.g., following recommended oral hygiene habits, keeping appointments), and utilization rates should be high. High rates would reflect some degree of program success. At the research level, it would be interesting to follow a sample of these students for some time after the program has ended. Have these students kept up with their oral hygiene practices? Are they seeking regular dental care? Did this program instill "dental health" as a value? If children had a negative experience, compliance rates and utilization rates would probably suffer. Although the nature of the program basically insures for high utilization, the child/patient may find ways to opt out of the system (e.g., convince his parent not to sign consent forms, lose the consent form, not cooperate while at the chair). Compliance in terms of oral hygiene practices may express dissatisfaction.

Because this program deals with young children, both parents' and patients' satisfaction should be measured. This type of data can be collected by either indirect or direct means.

As an indirect means, the percent of eligibles electing for dental treatment out of the school program might be useful. This data could be collected by questioning those parents who did not send back the consent forms. The reasons for not enrolling their child may help to improve the facility (e.g., possibly a large percent of parents who did not enroll child in program expressed dissatisfaction with the dentists' attitude).

As a direct measure, both patients and their parents could be given a questionnaire or interviewed about their satisfaction or dissatisfaction towards the program. Likewise, this type of information could be fed back to improve program operation.

Provider satisfaction is important to ensure program success. This type of information should be collected by questionnaire and/or interview. Provider attitudes about program administration, financial arrangements, time factors, and facilities should be ascertained. Negative feelings in this regard might be reflected in provider performance. Provider inputs are necessary for smooth program operation.

Although this list does not suggest focusing on outcomes related to dental health education, it is suggested that this area be considered in evaluating the Mary Hooker School dental program. Since there is a dental health education component to the dental

program, it would be useful to evaluate the dental health education component in terms of outcome measures. Examples of outcome measures pertaining to dental health education are: oral hygiene index, patient performance index, test measuring dental health knowledge, questionnaire about dental health attitudes.

The last component suggested to be included in the evaluation system not mentioned on the list is to gather morbidity statistics on gingivitis. This recommendation has been made on information from the screening program (refer to Appendix C). The screening program indicated that the average student in this school had mild gingivitis. By gathering data on the gingival condition of the students during the second year and last year of the program (by use of G.I. Index), the evaluators will be able to determine the extent that this program has affected the gingival status of this population.

MOST IMPORTANT COMPONENTS TO CONSIDER IN EVALUATING THE MARY HOOKER SCHOOL DENTAL PROGRAM:

This section is devoted to identifying the most important elements to consider in evaluating the dental program at the Mary Hooker School. Thus far, this evaluation system: provides objectives for evaluation; describes methods of collecting evaluative data; identifies components to be evaluated; suggests for review of the relationships between these evaluative components; and provides three different ways of viewing components of evaluation and their relationships. The three different ways of looking at

the components of evaluative information are: 1.) Measuring the extent that this program fulfills its objectives; 2.) Examining the change of these various components over time; 3.) Comparing different aspects of this program to a body of results and information from other programs. Of the three categories of information described, categories two and three are based on category one (a knowledge of the program objectives). To examine the change in various components over time (category two), the evaluator must be cognizant of the change that the program administrators want to achieve. Secondly, a knowledge of objectives or philosophy of the program is necessary to evaluate a comparison of aspects of one program or body of results to another program (category 3). From the previous discussion, it becomes apparent that a knowledge of the objectives and philosophy of a program is vital to the evaluation of a program.

At this point in the development of the evaluation system, it seems necessary to make a determination of which type of data would indicate the success or failure of this program. Although the specific program objectives are necessary to make an accurate determination of what constitutes the success or failure of this program (refer to Background of the Clinic, section on description of the dental program), the author suggests areas most critical in determining the success or failure of this program. The author bases these suggestions on her knowledge of the general objectives and philosophy of the program gained while working with the program.

The two most important factors in the evaluation of the Mary Hooker School dental program are an analysis of the DMFS index, and a cost analysis. The DMFS index is used to record the caries experience of a population. Since dental caries is the major cause of dental disease in school children, the DMFS are the most significant indicator of dental health in this population. If this program has made a substantial improvement in the dental health of this population, it will be reflected in an analysis of these scores. Second, it is crucial to determine the cost of this program. Do the effects of this program support the cost?

The following group of components are important in evaluating this school program, but are of secondary importance compared to DMFS analysis and cost analysis:

1. Utilization: Is there high utilization in this program compared to other programs? Has the utilization increased over the three years?

2. Education: Has this program increased the dental health knowledge of these school children?

3. Technical Quality: Is this program providing high quality dental care (according to a manual of standards)

4. Extractions: Has this program decreased emergency room visits for extractions?

All of the components of evaluation reviewed in section three are suggested to be included in the actual evaluation of the Mary Hooker School dental program. However, the six components suggested in this section are considered by the author to be most crucial in determining the success or failure of this program.

IV. SUMMARY AND CONCLUSIONS:

In this essay an evaluation system for a school-based dental program has been developed. From a review of the literature on dental program evaluation, the author has found: many evaluations of dental programs considered aspects of the program that are readily accessible and easily countable, regardless of their significance; aspects of programs that are more difficult to measure are often not included in the evaluation; program objectives are not necessarily considered in the evaluation of dental programs; finally, many dental program evaluations lack outcome measures.

Based on the review of the literature and on the specific needs of this school-based dental program, the author has designed an evaluation system. The system uses the Donabedian conceptual approach to evaluation. Evaluative data is primarily collected by reviewing records; however, direct observation of treatment, clinical and radiographic exam, and questionnaire plus interview are used as adjunct methods of collecting information. Objectives for the evaluation of the Mary Hooker School dental program are outlined. The author suggests that dental programs should be evaluated in terms of three dimensions: structure, process of care, and end results. The following components should be considered under the area of structure: physical plant, equipment and supplies, safety, personnel, administrative structure, program planning, statement of program objectives,

financial arrangements, comprehensiveness, availability, accessibility and eligibility, self-evaluation mechanism, side benefits, demographic data, program policy, allocation of services, and adequacy. The following components should be considered under the area of process of care: appropriateness of treatment, technical quality, inputs including capital, personnel and material, outputs including services performed and monetary value of services, productivity, efficiency measures (cost analysis), and utilization. Finally, the following components should be considered under the area of outcomes: analysis of DMFS scores, G.I. (gingival index) scores, number of extractions required, and OHI (oral hygiene) scores, disability statistics, patient and provider satisfaction, and measures of dental health knowledge. Although evaluation of all of these components have their place in evaluating the Mary Hooker School dental program, the author suggests that the two most critical factors in determining the success or failure of the program are an analysis of DMFS scores and a cost analysis.

The author recommends that the various components listed in the previous paragraph should be examined both singly and in terms of their relationship to one another. For example: How does the accessibility relate to the utilization rates? Through an analysis of the interrelationships between evaluative components can the dynamic nature of a program be truly understood.

The author has found that a knowledge of the philosophy and

objectives of a program are necessary to evaluate a program. The following four factors must be identified: the components of evaluation; methods of collecting data; the interrelationships between components of evaluation; and the program objectives; before evaluation can take place. Evaluation can be based on three different categories of information: 1.) Measuring the extent that a program fulfills its objectives; 2.) Examining the change in various components over time; 3.) Comparing aspects of a program to the same aspects in other programs. Some of the components can be viewed in terms of all three categories, others can only be evaluated within one of the preceding categories. Although it is convenient to quantify information for evaluative purposes, some of the components of evaluation do not lend themselves to quantification (e.g., accessibility). In order to evaluate components which do not lend themselves to quantification, it is necessary to look at the information in other ways. Consider the example of the component, accessibility. The accessibility of a dental clinic can be evaluated in terms of its change over time. Has the program tried to increase its accessibility over time. The accessibility of one program can be compared to the accessibility of another program. (Is clinic A more accessible than clinic B?)

The evaluation system designed in this essay can be used as a guide to assess other dental programs. This system provides a broad framework for assessing dental care at the program level. The author identifies components of evaluation, methods of

collecting data, and describes three ways of evaluating data. Depending on the individual evaluator's objectives, he can extract those components of evaluation, methods of collecting data, and ways of viewing information most applicable to the needs of his program.

V. SUGGESTIONS:

1. Dental programs should be evaluated. Funds and personnel for evaluation should be built into program design.

2. Although many areas of dental program evaluation must still be researched, enough is presently known to perform evaluations.

3. The specific objectives of evaluation should be outlined before data is collected. Only data that has program or research applicability should be collected.

4. Once evaluation data has been gathered and analyzed, the results should be used for program intervention and/or furthering knowledge in a specific area.

5. There are many methods of collecting evaluative data. A method, or combination of methods should be selected according to the specific characteristics of the dental program being assessed. Since the areas considered to evaluate are so diverse, often it is necessary to rely on more than one method of collecting data.

6. When evaluating a program, it is important to examine the interrelationship of structure, process, and outcome variables. Only through an analysis of the interrelationship of evaluative components can the dynamic nature of a program be truly understood.

7. The cost of performing evaluation should be considered when designing an evaluation system.

VI. RECOMMENDATIONS FOR FURTHER RESEARCH:

1. More research is needed to establish the relationship between different measures of program evaluation.

2. More research is needed to develop sophisticated methods of investigating the quality of care provided in dental programs.

3. Dentistry as a profession needs to come to some agreement on which aspects of dental care should be evaluated.

VII. LIMITATIONS:

1. The fact that this evaluation system was designed in the midst of program development presented various problems and resulted in limitations of the system:

   a. Since the objectives of the dental program were not actually stated, the author was forced to assume certain objectives from her experience working with the dental program. These objectives may or may not be valid.

   b. In view of the fact that the program wasn't completely developed, the system had to be presented in a general fashion and specific problems of implementation could not be discussed.

   c. Since actual data was not yet available, the system could not be tested for its practicality or its efficiency.

2. The dental profession, as represented by its professional organization, has not outlined which components and measurements are necessary to be considered in an evaluation of a dental program. The author had to rely on components and measures of evaluation suggested by experts in the field of dental program appraisal. In view of this situation, some factors considered in this essay may prove in the future to be irrelevant.

SCHOOL HEALTH PROJECT

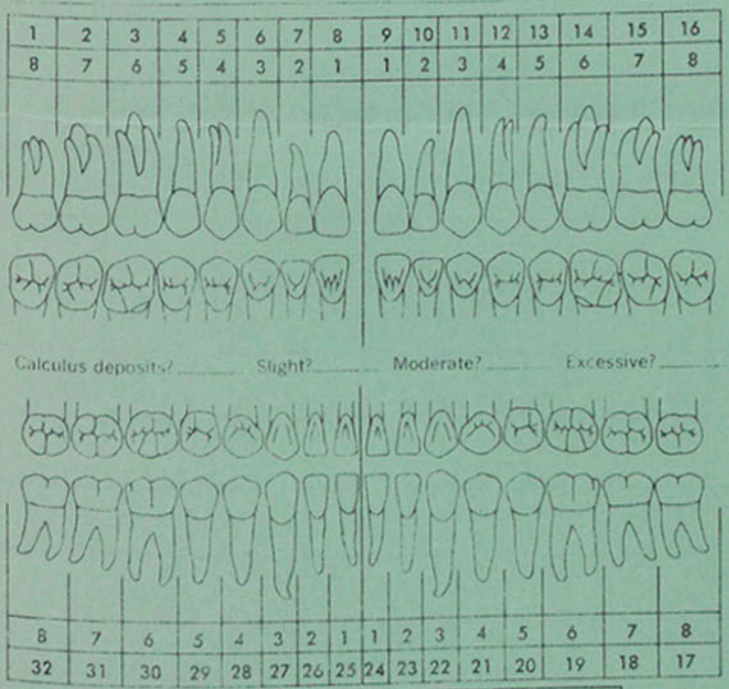
(Last Name) (First Name)

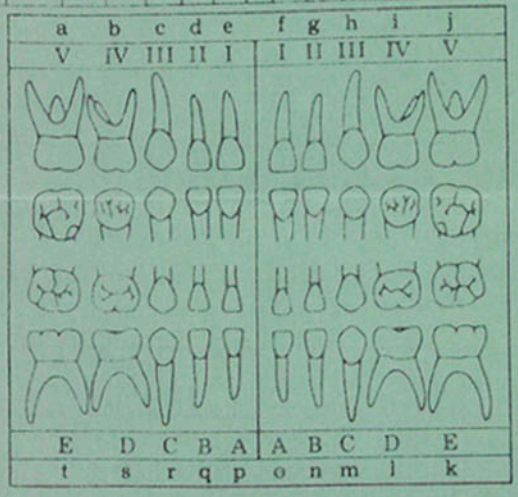
I.D.#: _____

Grade: _____ Room: _____

Parent/Guardian: _____

Phone: _____





Study Models: _____

Photographs: _____

MEDICAL PROBLEMS:

EXAMINATION:

Head and Neck:

Oral Cavity:

Lips-

Buccal Mucosa-

Gingiva-

Floor of Mouth-

Tongue-

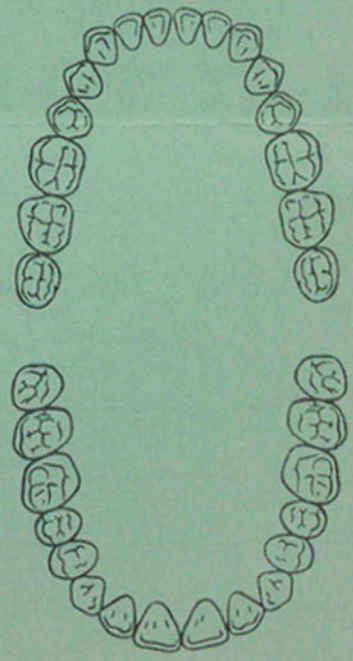
Hard Palate-

Soft Palate-

Pharynx-

Occlusal Condition:

Habits; Abnormalities:



PATIENT EDUCATION

ORAL HYGIENE

Date	Observations	By	Recommendations

(Last Name) (First Name) I.D.#:

TREATMENT PLAN: DATE:

BY:

Problem # & Sequence	Active Problem	Therapeutic Plans	Patient Education	Date Resolved/ By

DENTAL TREATMENT PROGRESS:

Date	Tooth #	Procedure	By

NAME_____

DATE_____

AM_____PM_____

MARY HOOKER SCHOOL

I.D. CODES	PROGRAM	PATIENT PRESENT	REFERRAL SOURCE	PRESENTING CONDITION	BODY AREA	PROCEDURES	POSITIVE FINDINGS	DIAGNOSTIC CATEGORY	MEDICATIONS	MEDS	SEEN BY: (Staff I.D.)	OTHER NON-STAFF	TELEPHONE	NATURE OF ACTIVITY	AMOUNT OF TIME	REFERRED TO	REFERRED BY	DISPOSITION	FOLLOW-UP

APPENDIX B

I.D. CODES:

Teacher	– 0001
Child Not School	– 0002
Adult, Family	– 0003
Adult, Not Family	– 0004
Teacher Group	– 0005
Child Group	– 0006
Parent Group	– 0007
Other Activities	– 0500

PROGRAM

Medical	– 1
Dental	– 2
Med./Dent.	– 3

PATIENT PRESENT:

Patient Present	– 1
Not Present	– 2
NA	– 0

REFERRAL SOURCE:

Self	– 1
Parent	– 2
Other Relative	– 3
Teacher	– 4
Principal	– 5
Soc. Services	– 6
Unit; Med.	– 7
Unit; Dental	– 8
Other	– 9
NA	– 0

PRESENTING CONDITION:

10 – WELL CHILD:

Examination	– 11
Radiographic Survey	– 12
Prophylaxis	– 13
History	– 14
Other Screening	– 15
Follow–up	– 16
Dent.Health Learning	– 17

20 – INJURY OR ILLNESS:

Preplanned Tx	– 21
Fractures	– 22
Swelling	– 23
Pain; Mouth	– 24
Pain; Teeth	– 25
Loose Primary Teeth	– 26
Lacerations	– 27
Localized Infection	– 28

60 – ADMINISTRATIVE:

Consent Slip	– 61
Other	– 99
NA	– 00

BODY AREA:

Hard Tissue	– 1
Soft Tissue	– 2
NA	– 0

PROCEDURES:

01 – DIAGNOSTIC:

Clinical Oral Exam	– 02
Radiographs – BWX	– 03
Radiographs – PAX	– 04
Caries Sus. Tests	– 05
Diagnostic Cases	– 06
Diagnostic Photo	– 07

10 – PREVENTIVE:

Dental Prophylaxis	– 11
Fluoride Treatment	– 12
Dietary Planning	– 13
Space Maintainer	– 14
Band Type	– 15

20 – RESTORATIVE:

Amal. (prim.teeth)	
One Surface	– 21
Two Surfaces	– 22
Three Surfaces	– 23
Amal. (perm.teeth)	
One Surface	– 24
Two Surfaces	– 25
Three Surfaces	– 26
Four Surfaces	– 27
Composite Resin:	
One Surface	– 28
Two Surfaces	– 29
Three Surfaces	– 30
Stainless Steel Crown	– 31
Polycarbonate Crown	– 32
Recement Crown	– 33
Intermediate Restor.	– 34
Other	– 35

40 – ENDODONTIC:

Pulp Cap (direct)	– 41
Pulp Cap (indirect)	– 42
Pulpotomy	– 43
Root Canal Therapy	
One Canal	– 44
Three Canals	– 45
Pulpectomy	– 46

PROCEDURES (cont.)

50 – PERIODONTICS

Gingival Curettage	– 51
Perio. Prophy.	– 52
Stabilization	– 53

60 – DENTAL HEALTH ED.

Oral Hygiene Inst.	– 61
Toothbrush Inst.	– 62
Floss Inst.	– 63
Nutrition Ed.	– 64

70 – ORAL SURGERY

Simple Extract.(single)	– 71
Two Extractions	– 72
Three Extractions	– 73
Four Extractions	– 74
Surgical Extraction	– 75
Ext. Tooth Fragments	– 76
Other	– 77

OTHER:

Admin./Rx.Meds	– 80
P.E.Specific to Cond.	– 81
Oral Temperature	– 82
Counselling	– 83
Referral	– 84
Clerical	– 85
Screening/Triage	– 86
Follow–up Report	– 87
Unit/Administrative	– 88
Research Activity	– 89
Case Conference	– 91
Teachers' Meetings	– 92
PAT/PPT	– 93
Continuing Education	– 94
In-Service Education	– 95
Community Liaison	– 96
Transport	– 97
Other	– 99

POSITIVE FINDINGS:

Positive	– 1
Negative	– 2
NA	– 0

DIAGNOSTIC CATEGORY:

Gingivitis	– 01
Periodontal Abscess	– 02
Caries	– 03
Pulpal Hyperemia	– 04
Pulpal Abscess	– 05
PAP	– 06
Retained Prim. Teeth	– 07
Retained Prim.Root Tip	08
Class II Malocclusion	– 09
Class III Malocclusion	– 10
Fractured Tooth	– 11
Lost Restoration	– 12
Periodontitis	– 13
Nutritional Deficiency	– 14
Soft Tissue Lesion	– 15
Cong.Abnorm.of Teeth	– 16
Acq.Abnorm.of Teeth	– 17
Avulsion	– 18
NA	– 00

MEDICATIONS

10 – ANTIBIOTICS:

Penicillin	– 11
Ampicillin	– 12
Erythromycin	– 13

50 – TOPICAL:

Steroid	– 58
Peroxide	– 59

60 – ANALGESICS:

N_2O	– 64
ASA/APAP	– 65
Codeine	– 66

70 – ROOT CANAL MED.:

N_2	– 71
ZOE	– 72
GP	– 73
CaOH	– 74

80 – SEDATIVES

90 – ANESTHETICS:

Local – Topical	*– 91*
Topical	*– 92*
NA	*– 00*

MEDS

Dispensed Only	– 1
Prescribed Only	– 2
Disp. & Rx.	– 3
NA	– 0

SEEN BY (Staff I.D.):

Betty Russell	– 01
Dorothy Shannon	– 11
Maria Garcia	– 12
Carol Dower	– 13
Jo Picone	– 21
Pat Soares	– 22
Joan Watkins	– 23
Betty Patterson	– 31
Angela Vona	– 41
Ellie Norton	– 51
Jack Levine	– 61
Al Hindin	– 62
Volunteer	– 81
Research	– 91
Nutritionist	– 92

OTHER NON–STAFF:

Parent	– 1
Other Relative	– 2
Teacher	– 3
Social Worker	– 4
Spec. Services	– 5
Principal & V.P.	– 6
Prim.Health Source	7
Prim.Dental Source	8
NA	– 0

TELEPHONE:

Contact	– 1
NA	– 0

NATURE OF ACTIVITY:

Unit	– 1
Classroom	– 2
Travel	– 3
Clinic Fac.	– 4
Home	– 5
Other	– 9

AMOUNT OF TIME:

(Record Hrs. & Minutes)

REFERRED TO:

Hartford Hospital	– 01
St. Francis	– 02
Mt. Sinai	– 03
Burgdorf	– 04
Newington	– 05
UConn	– 06
Private M.D.	– 07
Private D.M.D.	– 08
Lab	– 09
CHSI	– 10
Htfd.Health Dept.	– 11
Unit; Dental	– 12
NA	– 00

REFERRED BY:

Parent	– 1
Prog. Staff	– 2
NA	– 0

DISPOSITION

Class	– 1
Home	– 2
ER	– 3
Clinic	– 4
Unit; Med.	– 5
D.M.D.	– 6
M.D.	– 7
NA	– 0

FOLLOW–UP:

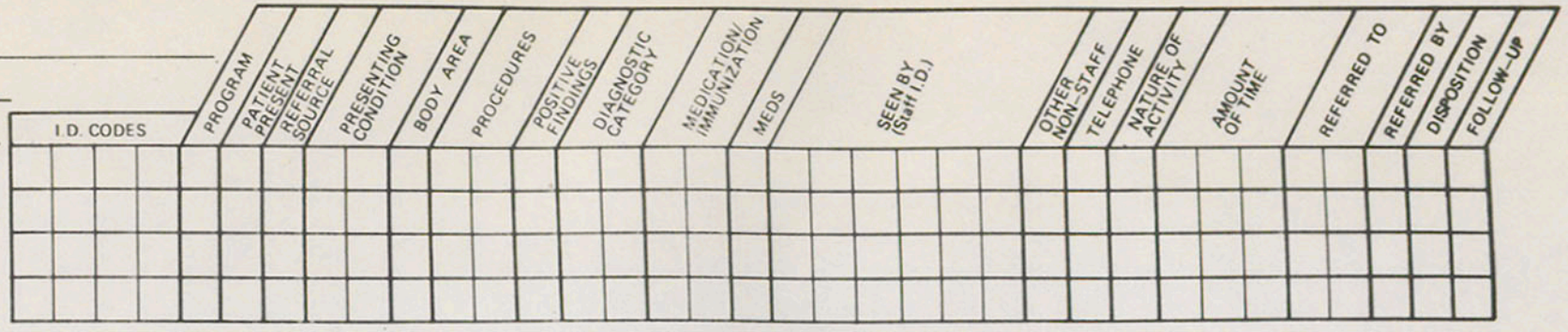
Scheduled	*– 1*
NA	*– 0*

NAME _____

DATE _____

AM_____PM _____

MARY HOOKER SCHOOL



HISTORY:

COUNSELLING:

PHYSICAL FINDINGS:

TREATMENT:

APPENDIX C

Last Name First Name MI Sex ___ ___ M F Birthdate ___/___/___ Mo. Day Yr. Age____

Grade & Room # _____ Exam # _____ Date _____

Examiner _____ Group _____ Patient I.D.# _____

GI Index

#	Score
3	
8	
14	
19	
24	
32	
# Teeth Examined	
Sum	

PHP Index

#	Score
3	
8	
14	
19	
24	
32	
# Teeth Examined	
Sum	

C. Incisor	L. Incisor	Cuspid	D. Molar 1 Bisucpid 1	D. Molar 2 Bisucpid 2	Molar 1	Molar 2

Frequency of Brushing ___ ___ ___ ___ 0 1 2 3+

Calculus present___ absent___

Treatment Priority _____

Ortho. Consult Req._____

APPENDIX C , continued:

The screening examination consisted of tabulation of three indices: the DMFS, GI, and PHP. The DMFS (decayed, missing, filled surfaces) index records the caries experience in a population. The GI (gingival index) records the gingival condition of a population. The PHP (personal hygiene performance) index records the level of oral hygiene in a population.

APPENDIX D

PRIORITY OF NEED CLASSIFICATION

I. Very Urgent: Functional and Social Disability Conditions Requiring Rapid Attention

A. pain and acute infections
B. suspected neoplasms
C. dental caries into or near the pulp
D. teeth obviously requiring extraction
E. disfiguring conditions, such as missing or badly decayed anterior teeth
F. rampant caries

II. Moderately Urgent: Conditions Requiring Care within Six Months

A. chronic or subacute periodontal conditions and heavy calcareous deposits
B. extensive penetration of caries into dentin
C. sufficient missing posterior teeth to require replacement (fewer than eight opposing posterior teeth)
D. space maintenance and interceptive orthodontics
E. moderate caries

III. Non-Urgent: Conditions Requiring Care Postponable for a Period of Time and Maintenance

A. periodontal surgery
B. incipient caries
C. replacement of missing teeth where fewer than Class I and Class II conditions
D. certain inlays or crowns on teeth previously restored with large amalgams, silicates, or stainless steel crowns
E. no apparent pathology
F. routine prophylaxis

These classifications are based upon thorough clinical examination with X-ray and other diagnostic procedures. Health education and control procedures not included, as they can be performed with all priorities independent of active treatment. This classification is presented only as an example and must be modified for different purposes. It was originally developed by Max H. Schoen and Jay W. Friedman.

GRADE: _____

DATE: _____

E/I.D.#	RM.	DATE PERMISSION SLIP			X-RAY	EXAM COMPLETED	TREATMENT		
		SENT	RETURNED	FOLLOW-UP(S)			PLAN	INITIATED BY	COMPLETED

APPENDIX E

APPENDIX F

MARY HOOKER HEALTH PROGRAM

To Parents:

Your child has been examined by the dentist and found to be in need of dental treatment.

The health unit at Mary Hooker School now has two dentists, Dr. Hindin and Dr. Levine, who can treat your child's dental problems. Dental care will be provided free of charge.

If you would like to have your child treated by the dentists, please sign this form at the bottom and return it to school. Dr. Levine or Dr. Hindin may be reached by calling 527-4443 if you have any questions.

Thank you,

Mary Hooker School
Health Unit

- -

I request that the dentists treat the teeth of _____

_____.

_____
(Signature of Parent or Guardian)

_____
(Date)

11/75

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X. CURRICULUM VITAE:

Wendy Corn Friedman
115 Nutmeg Lane, Apt. 327
East Hartford, Connecticut
(203) 568-7928

Birthdate: September 13, 1952
Birthplace: Rockville Centre, New York

Education:

1974-1976	Yale Medical School, Department of Epidemiology and Public Health, New Haven, Connecticut Major Area of Study: Health Services Administration Degree: Master of Public Health (expected May, 1976)
1972-1974	Columbia University, School of Dental and Oral Surgery, New York City, New York Major Area of Study: Dental Hygiene Degree: Bachelor of Science, Registered Dental Hygienist
1970-1972	University of Maryland, College Park, Maryland Major Area of Study: Health Education Degree: Transferred

Experience:

July 1975 to December 1975	University of Connecticut, Department of Behavioral Sciences and Community Health Position: Dental consultant for school health Model Duties: Interviewed personnel for dental program, obtained equipment and supplies for the program, organized a screening program, arranged for safety of dental operatories.

Curriculum Vitae
Wendy Corn Friedman, continued:

October 1974 to May 1975	Private Dental Practice, Dr. Murray Gillette, New Haven, Connecticut Position: Dental Hygienist Duties: Taking medical and dental histories, oral exams, scaling, cleansing and polishing, taking radiographs, chairside dental health education
September 1975 to December 1975	Yale Medical School, Department of Epidemiology and Public Health Duties: Class Project Group, Assessing nursing satisfaction at St. Mary's Hospital, Waterbury, Connecticut

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